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CLAIMS

1 1. A computer-aided method for balancing the spectral
2 response characteristics of vertically and transversely-
3 polarized seismic receiver components relative to an in-line
4 polarized seismic receiver component of a three-component
5 seismic transducer employed in a multi-dimensional seismic
6 survey, comprising:

7 defining limits for near-offset source-receiver
8 trajectory vectors in range and azimuth;

9 assembling in a computer matrix a plurality of seismic
10 wavefields emanating from near-offset source locations in a
11 common-receiver in-line gather, a common-receiver cross-line
12 gather and a common-receiver vertical gather;

13 defining a preferred reflection-time window length;

14 normalizing said common receiver gathers for spherical
15 divergence;

16 transforming said seismic wavefields from the time
17 domain to the frequency domain;

18 generating first deconvolution operators for the cross-
19 line component;

20 applying said first operators to the cross-line and the
21 vertical receiver gathers to form a corrected cross-line
22 component;

23 generating second deconvolution operators for
24 minimizing vertical component energy;

25 applying said second deconvolution operators to the
26 cross-line and vertical receiver gathers to form a corrected
27 vertical component.

1 2. A computer-aided method for balancing the spectral
2 response characteristics time-scale traces representative of
3 vertically and transversely-polarized seismic receiver

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components relative to an in-line polarized seismic receiver component of a three-component seismic transducer employed in a three-dimensional seismic survey, comprising:

a) selecting an initial receiver station and assembling in a computer matrix a plurality of seismic wavefields emanating from near-offset source locations in a common-receiver in-line gather, a common-receiver cross-line gather and a common-receiver vertical gather;

b) defining limits for near-offset source-receiver vectors in range and azimuth relative to the initial receiver station;

c) defining a preferred reflection-time window length;

d) normalizing said common receiver gathers for spherical divergence;

e) transforming said seismic wavefields from the time domain to the frequency domain;

f) calculating the terms for the cross-line component for each frequency from

$$\begin{pmatrix} \sum_i \cos^2(\theta_i) \dot{y}_i \bar{y}_i & \sum_i \cos^2(\theta_i) \dot{z}_i \bar{y}_i \\ \sum_i \cos^2(\theta_i) \dot{y}_i \bar{z}_i & \sum_i \cos^2(\theta_i) \dot{z}_i \bar{z}_i \end{pmatrix} \begin{pmatrix} c(\omega) \\ w(\omega) \end{pmatrix} = \begin{pmatrix} \sum_i \sin(\theta_i) \cos(\theta_i) \dot{x}_i \bar{y}_i \\ \sum_i \sin(\theta_i) \cos(\theta_i) \dot{x}_i \bar{z}_i \end{pmatrix};$$

g) solving for the cross-line coupling coefficients, $c(\omega)$ and $w(\omega)$ for each frequency;

h) calculating terms for each frequency for the vertical component from

$$v(\omega) \sum_i \dot{z}_i \bar{z}_i = w(\omega) \sum_i \dot{y}_i \bar{z}_i;$$

i) solving for the vertical coupling coefficients, $v(\omega)$ for each frequency;

